

## SEQUENCE LISTING

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Simpson Haidaris, Patricia J.  
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<120> POLYPEPTIDES AND IMMUNOGENIC CONJUGATES CAPABLE OF  
INDUCING ANTIBODIES AGAINST PATHOGENS, AND USES THEREOF

<130> 176/61731

<140> PCT/US2004/043959  
<141> 2004-12-31

<150> 60/533,788  
<151> 2003-12-31

<160> 67

<170> PatentIn Ver. 2.1

<210> 1  
<211> 9  
<212> PRT  
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<222> (1)  
<223> Xaa at position 1 is Arg, Lys, or Gln

<220>  
<221> PEPTIDE  
<222> (3)  
<223> Xaa at position 3 is any amino acid

<220>  
<221> PEPTIDE  
<222> (5)  
<223> Xaa at position 5 is optional and can be Pro

<220>

<221> PEPTIDE  
<222> (6)  
<223> Xaa at position 6 is Lys, Gln, or Arg

<220>  
<221> PEPTIDE  
<222> (8)  
<223> Xaa at position 8 is any amino acid

<400> 1  
Xaa Pro Xaa Pro Xaa Xaa Pro Xaa Pro  
1 5

<210> 2  
<211> 543  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: partial  
nucleotide sequence of the proline rich domain of  
mouse P. carinii kexin

<400> 2  
aaaccaaac ctcaaccaac acctcagcca acatctgagc caacatctga gccaacatct 60  
gagccaacat ctgaaccaac acctcaacca gcaccacctc aaccagcacc acctcaacca 120  
gcacctcaac cagcacctca accagcacct caaccagcac cacctcaacc agcaccacct 180  
caaccagtag cacctcaacc agtaccacct caaccaatgc catctagacc agcaccacct 240  
aaaccaaac ctcaaccaac atctgagcca gcacctcaac caacatctga gtcaacatct 300  
gaaccaaac ctcgaccacc acctcagcca acatctgagc caacatctga accaacatct 360  
gaaccaacat ctgaaccatc acctcaacca acacctcaac cagtacctca accagcacct 420  
caaccagcac cacctaaacc ggcacctaaa ccaacaccac ctaaaccggc acctaaacca 480  
acaccaccta aaccagcgcc taaaccagca ccatctaaat catcatctaa accaacatct 540  
aca 543

<210> 3  
<211> 181  
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<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: deduced amino  
acid sequence of the proline rich domain of mouse  
P. carinii kexin

<400> 3

Lys Pro Thr Pro Gln Pro Thr Pro Gln Pro Thr Ser Glu Pro Thr Ser  
 1 5 10 15  
 Glu Pro Thr Ser Glu Pro Thr Ser Glu Pro Thr Pro Gln Pro Ala Pro  
 20 25 30  
 Pro Gln Pro Ala Pro Pro Gln Pro Ala Pro Gln Pro Ala Pro Gln Pro  
 35 40 45  
 Ala Pro Gln Pro Ala Pro Pro Gln Pro Ala Pro Pro Gln Pro Val Pro  
 50 55 60  
 Pro Gln Pro Val Pro Pro Gln Pro Met Pro Ser Arg Pro Ala Pro Pro  
 65 70 75 80  
 Lys Pro Thr Pro Gln Pro Thr Ser Glu Pro Ala Pro Gln Pro Thr Ser  
 85 90 95  
 Glu Ser Thr Ser Glu Pro Thr Pro Arg Pro Pro Pro Gln Pro Thr Ser  
 100 105 110  
 Glu Pro Thr Ser Glu Pro Thr Ser Glu Pro Thr Ser Glu Pro Ser Pro  
 115 120 125  
 Gln Pro Thr Pro Gln Pro Val Pro Gln Pro Ala Pro Gln Pro Ala Pro  
 130 135 140  
 Pro Lys Pro Ala Pro Lys Pro Thr Pro Pro Lys Pro Ala Pro Lys Pro  
 145 150 155 160  
 Thr Pro Pro Lys Pro Ala Pro Lys Pro Ala Pro Ser Lys Ser Ser Ser  
 165 170 175  
 Lys Pro Thr Ser Thr  
 180

<210> 4

<211> 967

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: nucleotide  
sequence of *P. carinii* cDNA clone A12

<400> 4

accaatatat ccgaaccagc actgcctgat aaggatcctc aacctacatc ttcacctcag 60

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ccaaaacctc ggccaagacc tcgacctcaa cctcaacctc atccacatcc aaaacctcag 120
cctcagccga cgccagaacc tcagcctcag ccggcgccag aacctcgacc tcagccgacg 180
tcaaaacctc gacctcagcc aacgtcaaaa cctcgacctc agccgacgcc agaacctcga 240
cctctgccgg tgccaggacc tggacctctg ccggtgccag gacctcgacc tcaacctcaa 300
cctcaacctc aacctcagcc tcaacctcaa cctcagcctc aacctcaacc tcagcctcag 360
cctcagcctc agcctcagcc tcaacctcag ccgaagcctc aaccaccatc tcagtcaaca 420
tcagaatcag catcgcaatc caaaccaaaa ccaacaacac aaacaaaacc gtcaccgaga 480
ccacacccaa agccggtgcc aaaaccatca tcgatagaca caggaccatc aaaatcggat 540
tcaagcttca tttttacagt aacaaaaaca ataacaaga tatcagaaac agaaaaacca 600
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ccaacattgg aagaagttcc agaaactaaa gggaatggtg taagagtaat aggatttgag 780
gggttacaat tattatcaat gattgttgca ataataattg ggatatggat aatgtaaatt 840
taattagaag tcattggcta ttaaattaat atatagtaat ttgtaataat tagataaata 900
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aaaaaaa

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<210> 5

<211> 278

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: amino acid  
sequence of *P. carinii* cDNA clone A12

<400> 5

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Thr Asn Ile Ser Glu Pro Ala Leu Pro Asp Lys Asp Pro Gln Pro Thr
 1             5             10             15

```

```

Ser Ser Pro Gln Pro Lys Pro Arg Pro Arg Pro Arg Pro Gln Pro Gln
          20             25             30

```

```

Pro His Pro His Pro Lys Pro Gln Pro Gln Pro Thr Pro Glu Pro Gln
    35             40             45

```

```

Pro Gln Pro Ala Pro Glu Pro Arg Pro Gln Pro Thr Ser Lys Pro Arg
    50             55             60

```

```

Pro Gln Pro Thr Ser Lys Pro Arg Pro Gln Pro Thr Pro Glu Pro Arg
    65             70             75             80

```

```

Pro Leu Pro Val Pro Gly Pro Gly Pro Leu Pro Val Pro Gly Pro Arg
          85             90             95

```

```

Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln
    100             105             110

```

Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln Pro Gln  
 115 120 125

Pro Gln Pro Lys Pro Gln Pro Pro Ser Gln Ser Thr Ser Glu Ser Ala  
 130 135 140

Ser Gln Ser Lys Pro Lys Pro Thr Thr Gln Thr Lys Pro Ser Pro Arg  
 145 150 155 160

Pro His Pro Lys Pro Val Pro Lys Pro Ser Ser Ile Asp Thr Gly Pro  
 165 170 175

Ser Lys Ser Asp Ser Ser Phe Ile Phe Thr Val Thr Lys Thr Ile Thr  
 180 185 190

Lys Ile Ser Glu Thr Glu Lys Pro Ser Thr Lys Pro Ser Val Lys Pro  
 195 200 205

Thr Ser Thr Lys Thr Thr Ser Lys Pro Ser Thr Lys Pro Ser Thr Lys  
 210 215 220

Pro Ser Val Lys Pro Ala Ser Thr Lys Thr Thr Ser Glu Ser Glu Lys  
 225 230 235 240

Pro Thr Leu Glu Glu Val Pro Glu Thr Lys Gly Asn Gly Val Arg Val  
 245 250 255

Ile Gly Phe Glu Gly Leu Gln Leu Leu Ser Met Ile Val Ala Ile Ile  
 260 265 270

Ile Gly Ile Trp Ile Met  
 275

<210> 6

<211> 192

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: partial  
 deduced amino acid sequence of *S. pneumoniae* URSP2  
 PspA

<400> 6

Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Ile  
 1 5 10 15

Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser Lys Leu Asp Ala Lys Lys  
 20 25 30  
 Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu  
 35 40 45  
 Asp Ala Glu Ile Ala Lys Leu Glu Lys Asp Val Glu Asp Phe Lys Asn  
 50 55 60  
 Ser Asp Gly Glu Gln Ala Glu Gln Tyr Leu Val Ala Ala Lys Lys Asp  
 65 70 75 80  
 Leu Asp Ala Lys Lys Ala Glu Leu Glu Asn Thr Glu Ala Asp Leu Lys  
 85 90 95  
 Lys Ala Val Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Lys Pro Ala  
 100 105 110  
 Pro Ala Pro Ala Pro Thr Pro Glu Ala Pro Ala Pro Ala Pro Lys Pro  
 115 120 125  
 Ala Pro Ala Pro Lys Pro Ala Pro Ala Pro Ala Pro Thr Pro Glu Ala  
 130 135 140  
 Pro Ala Pro Ala Pro Lys Pro Ala Pro Ala Pro Lys Pro Ala Pro Ala  
 145 150 155 160  
 Pro Ala Pro Thr Pro Glu Ala Pro Ala Pro Ala Pro Lys Pro Ala Pro  
 165 170 175  
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 180 185 190

<210> 7

<211> 9

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<220>

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<222> (3)  
<223> Xaa at position 3 is any amino acid

<220>  
<221> PEPTIDE  
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<400> 7  
Arg Pro Xaa Pro Pro Lys Pro Xaa Pro  
1 5

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Arg Pro Xaa Pro Pro Gln Pro Xaa Pro  
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Arg Pro Xaa Pro Pro Arg Pro Xaa Pro  
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<210> 10  
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<400> 10  
Lys Pro Xaa Pro Pro Lys Pro Xaa Pro  
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<210> 11  
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<220>



<221> PEPTIDE  
<222> (8)  
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Lys Pro Xaa Pro Pro Gln Pro Xaa Pro  
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<400> 13

Gln Pro Xaa Pro Pro Lys Pro Xaa Pro  
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<210> 14

<211> 9

<212> PRT

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Gln Pro Xaa Pro Pro Gln Pro Xaa Pro  
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Gln Pro Xaa Pro Pro Arg Pro Xaa Pro

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5

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<223> Xaa at position 7 is any amino acid

<400> 16

Arg Pro Xaa Pro Lys Pro Xaa Pro

1

5

<210> 17

<211> 8

<212> PRT

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<220>

<221> PEPTIDE

<222> (7)

<223> Xaa at position 7 is any amino acid

<400> 17

Arg Pro Xaa Pro Gln Pro Xaa Pro

1

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<212> PRT

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<223> Xaa at position 3 is any amino acid

<220>

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<400> 18

Arg Pro Xaa Pro Arg Pro Xaa Pro

1

5

<210> 19

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<222> (3)

<223> Xaa at position 3 is any amino acid

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<221> PEPTIDE

<222> (7)

<223> Xaa at position 7 is any amino acid

<400> 19

Lys Pro Xaa Pro Lys Pro Xaa Pro

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5

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<210> 22

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<223> Xaa at position 7 is any amino acid

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Gln Pro Xaa Pro Lys Pro Xaa Pro  
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<210> 23  
<211> 8  
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<223> Xaa at position 3 is any amino acid

<220>  
<221> PEPTIDE  
<222> (7)  
<223> Xaa at position 7 is any amino acid

<400> 23  
Gln Pro Xaa Pro Gln Pro Xaa Pro  
1 5

<210> 24  
<211> 8  
<212> PRT

<213> Artificial Sequence

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<222> (3)

<223> Xaa at position 3 is any amino acid

<220>

<221> PEPTIDE

<222> (7)

<223> Xaa at position 7 is any amino acid

<400> 24

Gln Pro Xaa Pro Arg Pro Xaa Pro  
1 5

<210> 25

<211> 52

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Kexin Epitope  
S

<400> 25

aaaccggcac ctaaaccaac accacctaata ccagcgcta aaccagcacc aa 52

<210> 26

<211> 52

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Kexin Epitope  
AS

<400> 26

tggtgctggt ttaggcgctg gtttaggtgg tgttggtta ggtgccggtt ta 52

<210> 27

<211> 34

<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: A39 Epitope2  
S

<400> 27  
agaccagcac cacctaaacc aacacctcaa ccaa

34

<210> 28  
<211> 34  
<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A39 Epitope2  
AS

<400> 28  
tggttgaggt gttggttttag gtggtgctgg tcta

34

<210> 29  
<211> 25  
<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A32.1 Epitope  
S

<400> 29  
aaaccggcac ctaaaccaac accaa

25

<210> 30  
<211> 25  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: A32.1 Epitope  
AS

<400> 30  
tggtgttggt ttaggtgccg gttta

25



<210> 31  
<211> 25  
<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A32.2 Epitope  
S

<400> 31  
aaaccagcgc ctaaaccagc accaa

25

<210> 32  
<211> 25  
<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A32.2 Epitope  
AS

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tggtgctggt ttaggcgctg gttta

25

<210> 33  
<211> 28  
<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A32.3 Epitope  
S

<400> 33  
aaaccaacac cacctaaacc agcgccta

28

<210> 34  
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<223> Description of Artificial Sequence: A32.3 Epitope

AS

<400> 34

aggcgctggt ttaggtggtg ttggttta :

28

<210> 35

<211> 21

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: pSCREEN T7 10  
S

<400> 35

ctgggtaagg agattattgc g

21

<210> 36

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: A32 Epitope  
AS2

<400> 36

tggtgctggt ttaggcgctg g

21

<210> 37

<211> 26

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: A32 Epitope  
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<400> 37

tctaaatcat catctaaacc aacatc

26

<210> 38

<211> 19

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: pSCREEN T7 10  
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<400> 38

cgcaagcttg tcgacggag

19

<210> 39

<211> 49

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: A12 Epitope S

<400> 39

aaacctcgac ctcagccaac gtcaaaacct cgacctcagc cgacgccaa

49

<210> 40

<211> 49

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: A12 Epitope  
AS

<400> 40

tggcgtcggc tgaggtcgag gttttgacgt tggctgaggt cgaggttta

49

<210> 41

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: A12.2 Epitope  
S

<400> 41

aaacctcgac ctcagccgac gccaa

25

<210> 42  
<211> 25  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: A12.2 Epitope  
AS

<400> 42  
tggcgtcggc tgaggtcgag gttta

25

<210> 43  
<211> 25  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: A12'2 Epitope  
S

<400> 43  
gaacctcgac ctcagccgac gtcaa

25

<210> 44  
<211> 25  
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<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: A12'2 Epitope  
AS

<400> 44  
tgacgtcggc tgaggtcgag gttca

25

<210> 45  
<211> 25  
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<220>  
<223> Description of Artificial Sequence: A12'3 Epitope  
S

<400> 45  
gaacctcagc ctcagccggc gccaa

25

<210> 46  
<211> 25  
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<213> Artificial Sequence

<220>  
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AS

<400> 46  
tggcgccggc tgaggctgag gttca

25

<210> 47  
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<212> DNA  
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<220>  
<223> Description of Artificial Sequence: A12 S

<400> 47  
accaatatat ccgaaccagc

20

<210> 48  
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<223> Description of Artificial Sequence: A12 Mid AS

<400> 48  
ttctgatggt gactgagatg g

21

<210> 49  
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<220>  
<223> Description of Artificial Sequence: A12 Mid AS2

<400> 49  
ccgacgccag aacctcg

17

<210> 50  
<211> 22  
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<220>  
<223> Description of Artificial Sequence: Lambda  
forward

<400> 50  
tggcgacgac tcctggagcc cg

22

<210> 51  
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<212> DNA  
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<220>  
<223> Description of Artificial Sequence: Lambda  
reverse

<400> 51  
tgacaccaga ccaactggta atgg

24

<210> 52  
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<212> DNA  
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<223> Description of Artificial Sequence: PspA S2

<400> 52  
gcaagcttat gatatagaaa tttgtaac

28

<210> 53  
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<223> Description of Artificial Sequence: PspA AS

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ccacataccg ttttcttggt tccagcc

27

<210> 54

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: PspA S3

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acaagtctag ccagctcgc

19

<210> 55

<211> 27

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: PspA AS

<400> 55

ccacataccg ttttcttggt tccagcc

27

<210> 56

<211> 11

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: mouse P.  
carinii kexin fragment 777-787

<400> 56

Arg Pro Ala Pro Pro Lys Pro Thr Pro Gln Pro

1

5

10

<210> 57

<211> 12

<212> PRT

<213> Artificial Sequence

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carinii kexin fragment 131-142

<400> 57

Ser Gly Asp Thr Gly Asn Val Asn Ser Gly Glu Lys  
1 5 10

<210> 58

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii kexin fragment 856-872

<400> 58

Lys Pro Ala Pro Lys Pro Thr Pro Pro Lys Pro Ala Pro Lys Pro Ala  
1 5 10 15

Pro

<210> 59

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii clone A12 fragment 62-77

<400> 59

Lys Pro Arg Pro Gln Pro Thr Ser Lys Pro Arg Pro Gln Pro Thr Pro  
1 5 10 15

<210> 60

<211> 8

<212> PRT

<213> Artificial Sequence

<220>



<223> Description of Artificial Sequence: mouse P.  
carinii kexin fragment 856-863

<400> 60

Lys Pro Ala Pro Lys Pro Thr Pro  
1 5

<210> 61

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii kexin fragment 865-872

<400> 61

Lys Pro Ala Pro Lys Pro Ala Pro  
1 5

<210> 62

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii kexin fragment 860-868

<400> 62

Lys Pro Thr Pro Pro Lys Pro Ala Pro  
1 5

<210> 63

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii clone A12 fragment 70-77

<400> 63

Lys Pro Arg Pro Gln Pro Thr Pro  
1 5

<210> 64

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii clone A12 fragment 46-53

<400> 64

Glu Pro Arg Pro Gln Pro Thr Ser  
1 5

<210> 65

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: mouse P.  
carinii clone A12 fragment 54-61

<400> 65

Glu Pro Gln Pro Gln Pro Ala Pro  
1 5

<210> 66

<211> 1980

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: partial  
nucleotide sequence of P. carinii cDNA clone A12

<400> 66

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tattttgtag agttattgtg taaaagctat attgtcgccg aatgcagcgc cagtatttta 180  
atgttcaaat cttatgctct tatggaagcc tgtcttcacc cagaaaggat ctgtagagaa 240  
ttaaaaaatc atttttccga agaatctagg aaattagaaa ataaattaag gagtatttta 300  
aaaccacatc attatgaatg caaagatcta ggacaaaagt gcaactctgg attttatttt 360  
gatggagata tagaagctca atgcaatcat ttcaaaaaaa gatgtcaaga taaacaagag 420  
agactaaaat taattaatca tattgttgat tcactctgctc tttatctcgc aaatgaagta 480

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caatgcagaa cttatttcga cagtttttgt ggtgcgaatg taaaacaaga attcaaaca 540
atatgcaaca aaggagctaa tggcatatgc cctgatataa tagatgattc taaagaacat 600
tgtgctcatt tgattaatca tttaacatct cttggaattt catcgtcttc tgcttcactt 660
ccattggact attgcgactc agcgattaat tactgtaatt ctctttcgaa gttttgcacg 720
gaatcaaaac gacagtgcga ttctgttatt tctttctgca ctagcgaatc aaaaaaaact 780
gatgaatatg gttcttttat tgaccaatat cccgcggctg cagcaaatgc aaccaaatgc 840
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tgtgcttata ataaagatgg ttataccgaa atatgtaaaa acttaagaaa tttcatagaa 960
aaagcatgcg agaatttgag aattcattta catacttatg atacaaactc actcaatacg 1020
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cagccaaaac ctcggccaaag acctcgacct caacctcaac ctcatccaca tccaaaacct 1260
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cgacctctgc cgggtgccagg acctggacct ctgcccgtgc caggacctcg acctcaacct 1440
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cagcctcagc ctccagcctca gcctcaacct cagccgaagc ctcaaccacc atctcagtca 1560
acatcagaat cagcatcgca atccaaacca aaaccaacaa cacaacaaa accgtcaccg 1620
agaccacacc caaagccggt gccaaaacca tcatcgatag acacaggacc atcaaaatcg 1680
gattcaagct tcatttttac agtaacaaaa acaataacaa agatatcaga aacagaaaaa 1740
ccatctacaa aaccatctgt gaaaccaacc tctacaaaga caacatcaaa accatctaca 1800
aaaccatcta caaaaccatc tgtaaaacca gcctctacaa agaacaacatc agaatcagaa 1860
aaaccaacat tggaagaagt tccagaaaact aaaggggaatg gtgtaagagt aataggattt 1920
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<210> 67

<211> 659

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: deduced  
partial amino acid sequence of P. carinii cDNA  
clone A12

<400> 67

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Leu Asp Thr Arg Ala Asn Val Phe Ser Ser Cys Tyr Lys Glu Asp Met
  1             5             10             15

```

```

Asp Phe Ser Ala Lys Leu Asp Leu Leu Asn Arg Ile Lys Asp Lys Ile
      20             25             30

```

```

Val Val Pro Lys Gly Asn Thr Arg Tyr Phe Val Glu Leu Leu Cys Lys
    35             40             45

```

```

Ser Tyr Ile Val Ala Glu Cys Ser Ala Ser Asp Leu Met Phe Lys Ser

```

50		55		60
Tyr Ala Leu Met Glu Ala Cys Leu His Pro Glu Arg Ile Cys Arg Glu				
65		70		75 80
Leu Lys Asn His Phe Ser Glu Glu Ser Arg Lys Leu Glu Asn Lys Leu				
	85		90	95
Arg Ser Ile Leu Lys Pro Thr Tyr Tyr Glu Cys Lys Asp Leu Gly Gln				
	100		105	110
Lys Cys Asn Ser Gly Phe Tyr Phe Asp Gly Asp Ile Glu Ala Gln Cys				
	115		120	125
Asn His Phe Lys Lys Arg Cys Gln Asp Lys Gln Glu Arg Leu Lys Leu				
	130		135	140
Ile Asn His Ile Val Asp Ser Ser Ala Leu Tyr Leu Ala Asn Glu Val				
145		150		155 160
Gln Cys Arg Thr Tyr Phe Asp Ser Phe Cys Gly Ala Asn Val Lys Gln				
	165		170	175
Glu Phe Lys Gln Ile Cys Asn Lys Gly Ala Asn Gly Ile Cys Pro Asp				
	180		185	190
Ile Ile Asp Asp Ser Lys Glu His Cys Ala His Leu Ile Asn His Leu				
	195		200	205
Thr Ser Leu Gly Ile Ser Ser Ser Ser Ala Ser Leu Pro Leu Asp Tyr				
	210		215	220
Cys Asp Ser Ala Ile Asn Tyr Cys Asn Ser Leu Ser Lys Phe Cys Thr				
225		230		235 240
Glu Ser Lys Arg Gln Cys Asp Ser Val Ile Ser Phe Cys Thr Ser Glu				
	245		250	255
Ser Lys Lys Thr Asp Glu Tyr Gly Ser Phe Ile Asp Gln Tyr Pro Ala				
	260		265	270
Ala Ala Ala Asn Ala Thr Lys Cys Lys Val Thr Leu Lys Glu Leu Cys				
	275		280	285
Gln Asp Ser Ser Lys Lys Asp Ser Tyr Ser Thr Leu Cys Ala Tyr Asn				
	290		295	300
Lys Asp Gly Tyr Thr Glu Ile Cys Lys Asn Leu Arg Asn Phe Ile Glu				

305		310		315		320									
Lys	Ala	Cys	Glu	Asn	Leu	Arg	Ile	His	Leu	His	Thr	Tyr	Asp	Thr	Asn
				325					330					335	
Ser	Leu	Asn	Thr	Asn	Lys	Gly	Ser	Ala	Gln	Asp	Arg	Cys	Thr	Tyr	Ile
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Arg	Asn	Leu	Tyr	Phe	Lys	Phe	Lys	Asn	Ile	Cys	Leu	Leu	Val	Asp	Pro
		355						360				365			
Phe	Tyr	Asp	Leu	Ser	Pro	Ile	Ile	Thr	Gln	Glu	Cys	Lys	Thr	Asn	Ile
	370					375					380				
Ser	Glu	Pro	Ala	Leu	Pro	Asp	Lys	Asp	Pro	Gln	Pro	Thr	Ser	Ser	Pro
385					390					395					400
Gln	Pro	Lys	Pro	Arg	Pro	Arg	Pro	Arg	Pro	Gln	Pro	Gln	Pro	His	Pro
				405					410					415	
His	Pro	Lys	Pro	Gln	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Gln	Pro	Gln	Pro
			420					425					430		
Ala	Pro	Glu	Pro	Arg	Pro	Gln	Pro	Thr	Ser	Lys	Pro	Arg	Pro	Gln	Pro
		435					440					445			
Thr	Ser	Lys	Pro	Arg	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Arg	Pro	Leu	Pro
	450					455					460				
Val	Pro	Gly	Pro	Gly	Pro	Leu	Pro	Val	Pro	Gly	Pro	Arg	Pro	Gln	Pro
465					470					475				480	
Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro
				485				490						495	
Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro	Gln	Pro
			500					505					510		
Lys	Pro	Gln	Pro	Pro	Ser	Gln	Ser	Thr	Ser	Glu	Ser	Ala	Ser	Gln	Ser
		515					520					525			
Lys	Pro	Lys	Pro	Thr	Thr	Gln	Thr	Lys	Pro	Ser	Pro	Arg	Pro	His	Pro
	530					535					540				
Lys	Pro	Val	Pro	Lys	Pro	Ser	Ser	Ile	Asp	Thr	Gly	Pro	Ser	Lys	Ser
545					550					555				560	
Asp	Ser	Ser	Phe	Ile	Phe	Thr	Val	Thr	Lys	Thr	Ile	Thr	Lys	Ile	Ser

565

570

575

Glu Thr Glu Lys Pro Ser Thr Lys Pro Ser Val Lys Pro Thr Ser Thr  
 580 585 590

Lys Thr Thr Ser Lys Pro Ser Thr Lys Pro Ser Thr Lys Pro Ser Val  
 595 600 605

Lys Pro Ala Ser Thr Lys Thr Thr Ser Glu Ser Glu Lys Pro Thr Leu  
 610 615 620

Glu Glu Val Pro Glu Thr Lys Gly Asn Gly Val Arg Val Ile Gly Phe  
 625 630 635 640

Glu Gly Leu Gln Leu Leu Ser Met Ile Val Ala Ile Ile Ile Gly Ile  
 645 650 655

Trp Ile Met